Chapter 7

Seating Arrangements

CHAPTER HIGHLIGHTS

- ☞ *Seating Arrangement*
- ☞ *Linear Sequencing*
- ☞ *Circular Arrangement*

Linear Sequencing

Linear sequencing is essentially arranging the items given in a sequence (in a single line). The questions of this type are also referred to as 'seating arrangement'. The word 'seating arrangement' should not be misconstrued—it should not be treated as consisting of questions involving only persons sitting as per specified conditions. Essentially, these questions involve arranging subjects (people or things) satisfying the given conditions. The arrangement is done only on one 'axis' and, hence, the position of the subjects assumes importance here in terms of order: first position, second position, etc.

Let us look at the examples:

Direction for questions 1 to 5: Read the data given below carefully and answer the questions that follow.

Seven persons Paul, Queen, Rax, Sam, Tom, Unif, and Vali are sitting in a row facing us. Rax and Sam sit next to each other. There must be exactly four persons between Queen and Vali. Sam sits to the immediate right of Queen.

Solved Examples

Example 1: If Paul and Tom are separated exactly by two persons, then who sits to the immediate left of Vali?
(A) Paul (B) Tom (C) Unif (D) Rax

Example 2: If Queen is not sitting at either extreme of the row, then who among the following has as many persons on his left as on his right?
(A) Sam (B) Unif (C) Rax (D) Vali

Example 3: If Queen sits at one extreme, then who is at the other extreme?
(A) Paul (B) Tom
(C) Vali (D) Cannot be determined

Example 4: Tom sits to the right of Queen, and Paul is separated from Tom by exactly three persons. Then, who is sitting to the immediate left of Vali?
(A) Unif (B) Paul (C) Tom (D) Rax

Example 5: In how many different ways can the seven persons sit in a row?
(A) 3 (B) 2 (C) 10 (D) 12

Solutions for questions 1 to 5:

Let us write down the conditions given in short form and then represent them pictorially. Also, let us treat the left of the persons sitting as 'left' and their right as 'right' for interpreting the conditions.

Rax and Sam sit next to each other → RS or SR.

There are exactly 4 persons between Queen and Vali → Q — — — — V or V — — — — Q.

Sam sits to the immediate right of Queen → SQ.

Now, let us analyse the data/conditions that we are given and then put the three conditions together. Let us number the seats from *our* left to right as Seat 1 to Seat 7.

Since S is to the right of Q and since R and S have to be next to each other, R can come only to the immediate right of S. Thus, R, S, and Q, will be in the order RSQ. Since there are four persons between Q and V, Q can be placed in seats 1, 2, 6,' or 7. But if Q is in Seat 1 or 2, then, there are no seats for R and S. Hence, there are only two seats available for Q. Let us fix the positions of R, S, and V in each of these two positions of Q and write them down. The directions left and Right are as shown below.

◀ R ▶ L

Arrangement I:

1	2	3	4	5	6	7
	V			R	S	Q

Arrangement II:

1	2	3	4	5	6	7
	V			R	S	Q

These are the only two arrangements possible for the four persons V, R, S, and Q. The other three persons Paul, Tom, and Unif can sit in the three vacant seats in any order, as no information is given about them. Now let us look at each of the questions.

Example 1: Paul and Tom are separated by exactly two persons.

Arrangement I is the only one possible as in Arrangement II, Paul and Tom cannot have exactly two persons between them. So, we have the arrangement as follows:

T/P, V, U, P/T, R, S, Q

So, Unif must be sitting to the immediate left of Vali.

Hence, the correct option is (C).

Example 2: If Queen is not at the extreme right, then only Arrangement II above is possible. The person who has as many persons on his left as on his right can only be the person who is sitting in the middle seat, i.e., seat 4. In this arrangement, Rax is sitting in seat 4.

Hence, the correct option is (C).

Example 3: 'Queen sits at one extreme' means that we should look at arrangement I. In this arrangement, any one out of the three persons Paul, Tom, and Unif can be in seat 1, i.e. extreme right.

Hence, the correct option is (D).

Example 4: If Tom and Paul are separated by exactly three persons, then only Arrangement II is possible. So, Tom and Paul have to be in seats 3 and 7, Since, we are also given that Tom is to the right of Queen, Tom has to be in seat 3 and Paul, in seat 7. So, the arrangement must be as follows:

V, U, T, R, S, Q, P

The person sitting to the immediate left of Vali is Unif.

Hence, the correct option is (A).

Example 5: We have two possible arrangements—Arrangement I and Arrangement II that we looked at already. In each arrangement, the remaining three people can sit in the remaining three seats in 6 ways. Thus, a total of 12 ways of seating the seven persons is possible.

Hence, the correct option is (D).

Direction for questions 6 to10: Read the data given carefully and answer the questions that follow.

Seven boys—Rajan, Shyam, Vardhan, Mithra, Vimal, Raj and Kishan—are sitting in a row. Shyam sits to the immediate left of Vardhan and third to the right of Rajan, whereas Mithra, who sits at the left extreme, is next to Kishan.

Example 6: Who is sitting to the immediate right of Shyam?

(A) Mithra (B) Kishan
(C) Vimal (D) Vardhan

Example 7: If Vardhan and Kishan exchange places with each other without changing the rest of the arrangement that is already done, who will be sitting to the immediate left of Rajan?

(A) Kishan (B) Raj
(C) Vimal (D) Vardhan

Example 8: If only Shyam sits between Raj and Vardhan, who is exactly in the middle of the row?

(A) Raj (B) Vardhan
(C) Vimal (D) Rajan

Example 9: Which of the following cannot confirm the seating arrangement of all the boys?

(A) Raj is to the immediate right of Rajan, whereas Vimal is to the left of Shyam.
(B) Mithra and Raj have two persons between them.
(C) Raj and Kishan have two persons between them.
(D) Rajan and Shyam have two persons in between them.

Example 10: After arranging all the boys as per the conditions given in the data, if Rajan now exchanges his place with Mithra, and Vardhan exchanges his place with Vimal, then how many persons will be there between Vimal and Rajan?

(A) Three (B) Two
(C) Five (D) Cannot be determined

Solutions for question 6 to10:

Let us denote left and right as shown below:

◀ L ▶ R

Now, let us represent the data given in pictorial form (we use R for Raj and Rn for Rajan; Va for Vardhan; Vi for Vimal; S for Shyam; M for Mithra; and K for Kishan).

Mithra sits at the left extreme—next to Kishan → M K — — — — —.

Shyam sits to the immediate left of Vardhan and third to the right of Rajan → Rn — — S Va.

Putting both the arrangements together, Va can go only to extreme right position. Thus, we have the arrangement as M K Rn — — S Va.

Raj and Vimal occupy the two vacant seats between Rajan and Shyam.

Example 6: From the seating arrangement figure, Vardhan is to the immediate right of Shyam.

Hence, the correct option is (D).

Example 7: If Kishan and Vardhan exchange places, as can be seen from the arrangement, the person to the immediate left of Rajan will be Vardhan.

Hence, the correct option is (D).

Example 8: If Shyam sits between Raj and Vardhan, then the seating arrangement is as follows: Mithra, Kishan, Rajan, Vimal, Raj, Shyam, Vardhan. Then, Vimal will be exactly in the middle of the row.

Hence, the correct option is (D).

Example 9: Statement (A) makes the arrangement as: Mithra, Kishan, Rajan, Raj, Vimal, Shyam, Vardhan

Statement (B) gives the seating arrangement as: Mithra, Kishan, Rajan, Raj, Vimal, Shyam, Vardhan.

Statement (C) makes the seating arrangement as: Mithra, Kishan, Rajan, Vimal, Raj, Shyam, Vardhan.

So, only statement (D) cannot make the seating arrangement unique while others can.

Hence, the correct option is (D).

Important point to note is that, on the basis of the given data, we know that the places of only Raj and Vimal have not been fixed. Hence, if there is an additional statement that we are considering to determine the arrangement uniquely, it should have at least one of the two people Raj and Vimal. In this case, choice (D) does not have either one of the two names, and, hence, this statement cannot help us determine the arrangement uniquely. So, this becomes the answer choice.

Hence, the correct option is (D).

Example 10: The arrangement is

M K Rn R/Vi Vi/R S Va

Rajan exchanges his place with Mithra, and Vimal with Vardhan, then we have the following arrangement:

Rn K M R/Va Va/R S Vi.

While we still do not know the exact position of Vardhan (or which place Vimal sits), we can see that there are five persons between Rajan and Vimal.

Hence, the correct option is (C).

In addition to the questions that we saw, where a set of questions are based on the data given, there are also 'stand-alone' questions. In these questions, on the basis of the data given, only one question is asked. Given below is an example of this type.

Direction for question 11: Select the correct alternative from the given choices.

Example 11: Four persons A, B, C, and D arrive to attend a meeting. D arrives 10 minutes after B and 20 minutes before A, who arrives 10 minutes before C. Who is the first person to arrive at the meeting?

(A) A (B) B (C) C (D) D

Solution for question 11:

C arrived after A. A arrived after D. D arrived after B. This implies that B arrived first.

Hence, the correct option is (B).

Circular Arrangement

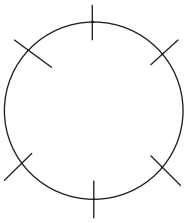
Questions on circular arrangement involve seating of people around a table or arrangement of things in a circular manner (e.g. different coloured beads strung to form a necklace).

In case of people sitting around a table, the table could be of any shape—rectangular, square, circular, or any other.

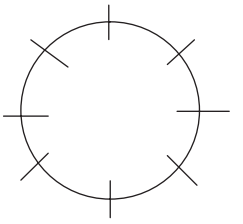
The data given in such sets of questions specify the positions of some or all of the individuals (or things) in the arrangement. The positions are specified through conditions involving specified persons sitting (or not sitting) opposite each other or a particular person sitting to the right or left of another person, etc.

Once you read the data, first draw the shape specified in the data and then draw the slots in the seating arrangement.

Six people around a circular table



Eight people around a circular table



Statements like 'A and B are sitting farthest from each other' or 'A and B sit across the table' imply that A and B sit opposite each other.

On the other hand, you should remember that, unlike in straight-line arrangement, the words 'immediately' and 'directly' do not play any role in circular arrangement. In general, there is no left side or right side (unless we are talking of 'immediate right' or 'immediate left').

So, if it is given that C sits to right of B, then it is clear that C must be to the immediate right of B. Go 'anti-clockwise' if anybody's right has to be located, and go 'clockwise' if somebody's left has to be located.

Let us take some examples.

Direction for questions 12 to 16: Read the following information and answer the questions that follow.

P, Q, R, S, and T sit around a table.

P sits two seats to the left of R and Q sits two seats to the right of R.

12. If S sits in between Q and R, who sits to the immediate right of P?
(A) T (B) S (C) Q (D) R

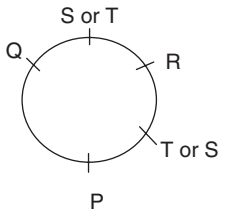
13. Which of the following cannot be the correct seating arrangement of the five persons in either the clockwise direction or the anticlockwise direction?
(A) P, Q, R, S, T (B) P, S, R, T, Q
(C) P, Q, S, R, T (D) P, T, R, S, Q

14. If S is not sitting next to Q, who is sitting between Q and S?
(A) R (B) P
(C) T (D) Both (R) and (P)

15. If a new person U joins the group such that the initial conditions for the seating arrangement should be observed and also a new condition that U does not sit next to R be satisfied, then which of the following statements is true?
(A) U sits to the immediate right of S.
(B) U sits to the immediate left of T.
(C) U sits to the immediate left of P.
(D) Either (A) or (B) above

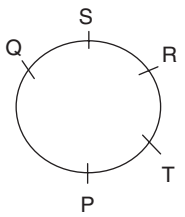
16. If a new person U joins the group such that the initial conditions for the seating arrangement should be observed and also a new condition that U does not sit next to P, S or T be satisfied, then who will be the neighbours of P (one on either side)?
(A) S and T (B) S and Q
(C) T and R (D) R and Q

Solutions for questions 12 to 16:



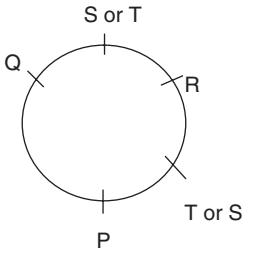
P sits two seats to the left of R, and Q sits two seats to the right of R. We can represent this information in the diagram below.

12. If S sits between Q and R, then the arrangement is as follows.



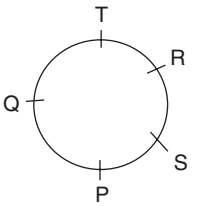
As can be seen from the diagram, T is to the immediate right of P.
Hence, the correct option is (A).

13. We will take each choice and see whether it fits in the arrangement that we represented through a diagram in the analysis of the data (the same diagram is reproduced below).



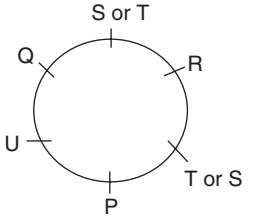
We can see that the arrangement given in choice (A) is not possible,' and, hence, the answer choice is (A).
Hence, the correct option is (A).

14. If S is not next to Q, then the seating arrangement is fixed as follows.



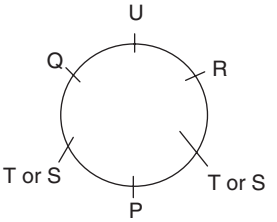
Now P is between Q and S.
Hence, the correct option is (B).

15. On the basis of the diagram that we drew, we find that to accommodate U we have to create a new slot between P and Q.



Hence, choice (C) is the correct answer.

16. We create a new slot for the sixth person. But since U will not sit next to P, S, or T, he will have to sit between R and Q. The arrangement will then look as follows:



As we can see from the diagram, the neighbours of P will be T and S.
Hence, the correct option is (A).

Direction for questions 17 to 21: Read the following information and answer the questions that follow.

There are 10 persons at a round table conference, consisting of a Professor, a Lawyer, a Doctor, a Scientist, an Accountant, a Grocer, two Computer Specialists, and two Marketing Executives. The Professor sits opposite to the Lawyer. The Scientist and the Doctor sit opposite each other. The two Marketing Executives sit opposite each other with one of them sitting to the immediate left of the scientist. The Professor sits to the immediate right of the Scientist.

17. If the two Computer Specialists sit opposite each other but neither of them is immediately next to any Marketing Executive, who sits to the immediate right of the professor?
(A) Computer Specialist
(B) Marketing Executive
(C) Grocer
(D) Accountant

18. If the Grocer and Accountant do not sit opposite each other, then which of the following must be TRUE?
(A) The Computer Specialist cannot sit beside the Lawyer.
(B) One of the Computer Specialists is next to a Marketing Executive.
(C) The Professor cannot have the Scientist and a Computer Specialist on his either side.
(D) The Computer Specialists must sit next to one another.

19. If the Grocer and the Accountant each have a Marketing Executive as his immediate neighbour, then which of the following is definitely FALSE?
(A) The two Computer Specialists are opposite each other.
(B) A Computer Specialist is an immediate neighbour of the Scientist.
(C) The Grocer is next to a Computer Specialist.
(D) A Computer Specialist is an immediate neighbour of the Lawyer.

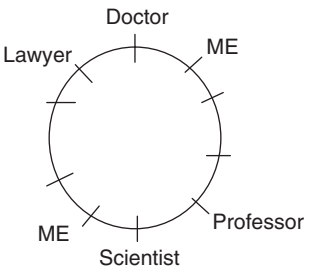
20. If a Computer Specialist is the immediate neighbour of a Marketing Executive and the Grocer is the immediate neighbour of the Lawyer, how many different kinds of seating arrangements are possible? (Assume that the two Computer Specialists are indistinguishable from each other and the two Marketing Executives are indistinguishable from each other.)
(A) 3 (B) 6 (C) 16 (D) 8

21. The maximum number of persons you can count if you start counting with the Scientist and end with a Marketing Executive (excluding both) is
(A) 0 (B) 8 (C) 5 (D) 6

Solutions for questions 17 to 21:

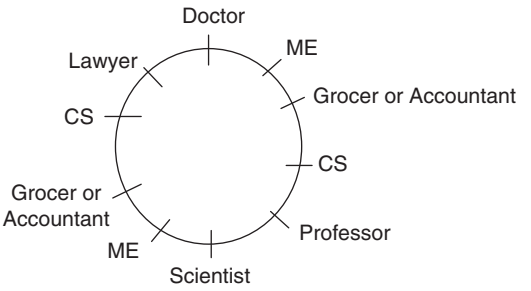
The Professor sits to the immediate right of the Scientist and opposite to the Lawyer. The Scientist sits opposite to the Doctor and one Marketing Executive is to the immediate left of the Scientist.

Choosing to place the Scientist in one of the 10 seats, we have the arrangement as follows.



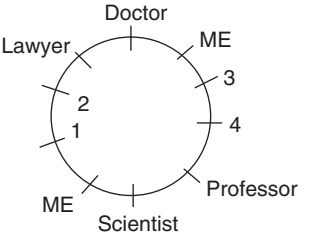
The vacant seats are one each for the two Computer Specialists, one for the Grocer and one for the Accountant.

17. The two Computer Specialists sit opposite each other. Neither of them is next to any Marketing Executive. So, the arrangement must be as follows



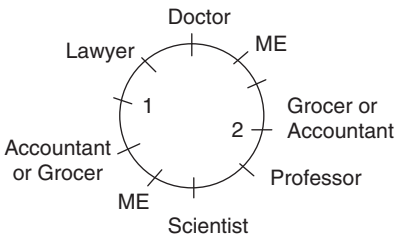
So, a Computer Specialist sits to the immediate right of the professor.
Hence, the correct option is (A).

18. The Grocer and the Accountant do not sit opposite each other. Then, the arrangements can be as follows:



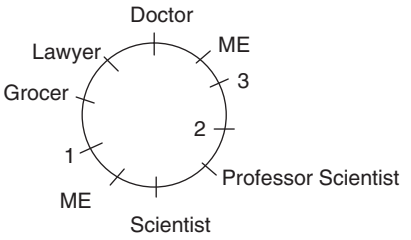
The Grocer and the Accountant can occupy the following pairs of seats: 3 and 4, 1 and 4, 1 and 2, or 2 and 3. Then, the two Computer Specialists may occupy one of the pairs of seats 1 and 2, 2 and 3, 3 and 4, or 4 and 1. We check for the choices given in the question, one by one, and find that whichever combination is taken, there is a Computer Specialist in seat 1 or seat 3, both of, which are next to the Marketing Executives seats. So, choice (B), which states that one of the Computer Specialists is next to a Marketing Executive, is true.
Hence, the correct option is (B).

19. The Grocer and the Accountant have one each of the Marketing Executives on their immediate side. So, the arrangement must be as follows.



Now the Computer Specialists must sit in chairs 1 and 2 only. But, no Computer Specialist can be the immediate neighbour of the Scientist. Choice (B) is definitely FALSE. (Note that choices (A), (C), and (D) are true). Hence, choice (B) is the correct answer.
Hence, the correct option is (B).

20. Given that the Grocer is the immediate neighbour of the Lawyer, we have the three slots numbered 1, 2, and 3 (in the following diagram) free for the two Computer Specialists and the Accountant. Since a Computer Specialist has to be next to a Marketing Executive, he should be in slot 1 or 3. By fixing the Accountant in any one of the three slots 1, 2, or 3, we can ensure that there is a Computer Specialist next to a Marketing Executive. Hence, there are three possible seating arrangements.



Hence, the correct option is (A).

21. Based on the seating arrangement that we discussed, the number of persons between the Scientist and a Marketing Executive can be 3 or 8 (counted clockwise) or 0 or 5 (counted anticlockwise). Maximum number that can be counted is 8.
Hence, the correct option is (B).

Exercises

Direction for questions 1 to 3: These questions are based on the following information.

Five boys Anil, Charan, David, John and Kamal sit in a row facing north, not necessarily in the same order.

I. John sits exactly in between Anil and David.
II. John sits exactly in between Charan and Kamal.

1. Who sits exactly at the middle of the row?
(A) John
(B) Kamal
(C) David
(D) Cannot be determined

2. In how many different ways these five boys can sit?
(A) 2 (B) 4 (C) 8 (D) 16

3. If Anil sits to the immediate left of John and if a boy sits to the immediate right of Kamal then who is that boy?
(A) David
(B) Anil
(C) Charan
(D) None of these

Direction for questions 4 to 6: These questions are based on the following information.

Seven girls A, B, C, D, E, F, and G sit in a row facing north, not necessarily in the same order. It is also known that,

I. Two girls sit in between B and F.
II. Three girls sit in between C and G.
III. Four girls sit in between A and D.

4. Who sits exactly at the middle of the row?
(A) B
(B) D
(C) E
(D) Cannot be determined

5. If B sits to the immediate right of D then who sits in between A and E?
(A) F
(B) C
(C) G
(D) Cannot be determined

6. If F and G sit on either sides of E then who sits at the right end of the row?
(A) A
(B) C
(C) D
(D) Cannot be determined

Direction for questions 7 to 9: These questions are based on the following information.

Five persons P, Q, R, S, and T sit in a row facing North not necessarily in the same order. The following information is known about them:

I. Either P or S sits at the one end of the row.
II. Either Q and T or S and T sit on either sides of P.
III. R sits to the left of S and to the immediate left of Q.

7. In how many different ways can these five people sit?
(A) 2 (B) 3
(C) 1 (D) 4

8. If Q sits to the immediate left T then who sits exactly at the middle of the row?
(A) P (B) R
(C) T (D) Cannot be determined

9. If P is not sitting adjacent to S, then who sits to the immediate right of Q?
(A) Q (B) P
(C) R (D) Cannot be determined

Direction for questions 10 to 12: These questions are based on the following information.

Each of six persons Pavan, Raman, Kiran, Charan, Shravan and Rajan stay in a different floor of a six-storied (1^{st}, 2^{nd}, 3^{rd}, 4^{th}, 5^{th}, and 6^{th} from bottom to top, respectively) building.

I. Raman stays above Kiran but below Charan.
II. Pavan stays below Rajan but above Shravan.
III. Kiran stays above Pavan but below Raman who stays above Rajan.

10. Who stays in the 2^{nd} floor?
(A) Pavan
(B) Shravan
(C) Rajan
(D) Cannot be determined

11. Who stays in the 4^{th} floor?
(A) Raman
(B) Rajan
(C) Kiran
(D) Cannot be determined

12. If one person stays in between Pavan and Kiran then who stays in the 3^{rd} floor?
(A) Shravan (B) Pavan
(C) Rajan (D) Charan

Direction for questions 13 to 15: These questions are based on the following information.

There are five buildings of different heights in a row. These houses are painted with a different colour among red, blue, white, green, and yellow such that each house is painted with exactly one colour.

The following information is know about them:

I. Yellow and green buildings are on either sides of the white building.
II. The shortest building is painted in red colour but it is neither at any end of the row nor adjacent to the tallest building.
III. The white building is exactly in between the tallest and the second tallest buildings.

13. Which among the following buildings is definitely at one end of the row?
(A) Yellow building
(B) Green building
(C) The tallest building
(D) The third tallest building

14. Which among the following is definitely false?
(A) The white building is the third tallest
(B) The third tallest and the shortest buildings are together
(C) Blue and yellow buildings are at either ends of the row.
(D) Yellow and green buildings are at either ends of the row.

15. If the yellow building is to the immediate left of the third tallest building, then what could be the order of these buildings in the descending order of their heights?
(A) blue, yellow, red, white, green
(B) blue, green, white, yellow, red
(C) green, white, blue, yellow, red
(D) green, yellow, white, blue, red

Direction for questions 16 to 18: These questions are based on the following information.

Each of the six persons—John, Ted, Humpty, Dumpty, Jack and Jill, is from one different country among India, Japan, China, Australia, America, and England and are sitting around a circular table, may not be in the same order. John, who is from China, is sitting adjacent to American, who is not Humpty. Ted is not an Indian, and Chinese is not sitting adjacent to Indian. The person from England is sitting one place away to the left of the Australian. Humpty is sitting opposite the Indian, who is adjacent to the Japanese. Australian and Dumpty are sitting opposite each other. Jack is not from India and Ted is not from Japan but both are not adjacent to each other.

16. Who among them is from India?
(A) Jill (B) Dumpty
(C) Humpty (D) None of these

17. If Jack is the Japanese, then who is sitting opposite the American?
(A) Jill (B) Ted
(C) Jack (D) Dumpty

18. Which country does Humpty belong to?
(A) Japan (B) Australia
(C) America (D) England

Direction for questions 19 to 22: These questions are based on the following information.

Eight persons—Ram, Ramesh, Mohan, Sohan, Seema, Saroj, Sakshi, and Saloni, are sitting around a circular table. Each of them is one among doctor, engineer, dancer, singer, teacher, lawyer, Accountant, and Pilot, not necessarily in the given order. Further more it is known that

I. Pilot is sitting opposite Ramesh, who is adjacent to the accountant.
II. Dancer is sitting opposite the lawyer and is not adjacent to Sakshi who is not sitting adjacent to the lawyer.
III. Saloni is sitting opposite the engineer, Ramesh is not a lawyer or doctor or engineer.

IV. Sakshi, the singer, is sitting one place away to the right of Saroj.
V. Seema is sitting opposite the lawyer and Ram is sitting opposite the dancer.
VI. Ramesh is sitting three places to the right of singer. Mohan is neither the accountant nor adjacent to the dancer.

19. Who among the following is the doctor?
(A) Ramesh
(B) Saloni
(C) Saroj
(D) Cannot be determined

20. What is the profession of Mohan?
(A) Accountant
(B) Pilot
(C) Engineer
(D) Cannot be determined

21. Who is sitting opposite Ramesh?
(A) Seema (B) Sakshi
(C) Saroj (D) None of these

22. Who is sitting opposite the accountant?
(A) Sakshi (B) Mohan
(C) Seema (D) Saroj

Direction for questions 23 to 25: These questions are based on the following information.

Eight persons—Arun, Pankaj, Rohan, Veda, Suman, Shanu, Dimple, and Pinky, are sitting around a circular table for a group discussion. Suman is not sitting opposite Pinky, and Shanu is sitting three places away to the right of Pankaj. Dimple is sitting in between Pankaj and Suman. Rohan is sitting adjacent to Pankaj who is sitting opposite Arun.

23. Who is sitting opposite Dimple?
(A) Piniky
(B) Shanu
(C) Rohan
(D) Cannot be determined

24. Who is sitting opposite Veda?
(A) Suman
(B) Pinky
(C) Shanu
(D) Cannot be determined

25. If Rohan is sitting to the left of Veda, then who is sitting opposite Shanu?
(A) Rohan
(B) Dimple
(C) Suman
(D) Cannot be determined

Answer Keys

1. A	**2.** C	**3.** B	**4.** C	**5.** D	**6.** D	**7.** A	**8.** C	**9.** B	**10.** A
11. D	**12.** C	**13.** C	**14.** D	**15.** D	**16.** B	**17.** A	**18.** B	**19.** B	**20.** C
21. C	**22.** A	**23.** D	**24.** A	**25.** B					